Numeracy
Numeracy

REVISED EDITION
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The BC performance standards have been developed for voluntary use in BC schools. They describe the professional judgments of a significant number of BC educators about standards and expectations for the following key areas of learning:

- reading
- writing
- numeracy
- social responsibility

The standards focus exclusively on performance assessment. In performance assessment students are asked to apply the skills and concepts they have learned to complete complex, realistic tasks. This type of assessment supports a criterion-referenced approach to evaluation and enables teachers, students, and parents to compare student performance to provincial standards.

The BC performance standards are intended as a resource to support ongoing instruction and assessment. Teachers can use these standards to:

- monitor, evaluate, and report on individual student performance
- identify students who may benefit from intervention
- develop a profile of a class or group of students to support instructional decision-making
- prompt discussions with parents, students, and other teachers about student performance
- inform professional development activities
- collaboratively set goals for individuals, classes, or schools
- develop evidence for school growth plans
- provide models for designing performance tasks
REFERENCE SET CONNECTION

The BC performance standards are a continuation of the work begun in the provincial reference sets.

Starting in 1991, the province developed reference sets for reading, writing, mathematical development, group communication skills, and problem solving. The reference sets show the broad range of possible student development in each of these essential skill areas. They can be used to evaluate student work in any subject.

The BC performance standards work within these same ranges of development in the same areas. They can also be used to evaluate these skills in any subject. However, the standards focus on levels of performance at particular grades.

For both sets of documents, teachers used their experience and student work to develop and validate the materials. Both also use student work and teacher comments to illustrate and describe levels of performance.

LEARNING OUTCOMES

Learning outcomes describe what students are supposed to learn in each subject and at each grade level. Learning outcomes are often called content standards. Content standards answer the question: “What knowledge, skills, and attitudes are students expected to develop at this grade level?”

The ministry’s Integrated Resource Packages list prescribed learning outcomes for BC provincial curricula for each subject and grade level.
**PERFORMANCE STANDARDS**

Performance standards describe levels of achievement in key areas of learning. Performance standards answer the questions: “How good is *good enough*? What does it look like when a student’s work has met the expectations at this grade level?”

The BC performance standards describe and illustrate the following four levels of student performance in terms of prescribed learning outcomes relevant to the key areas of reading, writing, numeracy, and social responsibility.

**NOT YET WITHIN EXPECTATIONS**
- the work does not meet grade-level expectations
- there is little evidence of progress toward the relevant prescribed learning outcomes
- the situation needs intervention

**MEETS EXPECTATIONS (MINIMAL LEVEL)**
- the work may be inconsistent, but meets grade-level expectations at a minimal level
- there is evidence of progress toward relevant prescribed learning outcomes
- the student needs support in some areas

**FULLY MEETS EXPECTATIONS**
- the work meets grade-level expectations
- there is evidence that relevant prescribed learning outcomes have been accomplished

**EXCEEDS EXPECTATIONS**
- the work exceeds grade-level expectations in significant ways
- the student may benefit from extra challenges
Key Components

These key components are included for each grade level.

Rating Scale. This is the full version of the performance standards, with the four performance levels described in detail.

Quick Scale. This is a short-form summary of the Rating Scale. Quick Scales are intended for daily use. Teachers may also want to share them with students and parents.

Sample Tasks. These are tasks developed by practising teachers to provide opportunities to assess student work in the skill area. Each sample task includes examples of student work. Teachers may use the tasks as given or as models. Any tasks used should first be reviewed for issues sensitive to the class or community.

Additional sample tasks, student work, and other support materials are available at the Ministry of Education's web site.
Level of Work.

Teacher's Observations. These are additional comments by the teacher and key relevant criteria from the Rating Scale.

Rating Scale Icon. This is a generalized summary of the scale completed by the teacher. Here is how the actual scale looks for this sample:

Student Work. This shows a reproduction of the student's work. (Names of students and teachers have been changed where this information could be used to identify individuals.)
The BC performance standards can contribute to a comprehensive assessment and evaluation system.

Teachers use a variety of methods to gather the information they need to assess, evaluate, and report on student learning. Possible methods include classroom and standardized tests, observations, student work portfolios, conferences, self- and peer assessment, and performance tasks.

The BC performance standards give teachers a way to assess students’ abilities to apply their learning in realistic performance tasks in the areas of reading, writing, numeracy and social responsibility. Used with other methods, they can be an important part of a comprehensive assessment and evaluation system. The standards:

- should be used within the context of ongoing classroom instruction. They are meant to be curriculum-embedded—used as part of regular classroom learning activities.
- provide resources for assessing and evaluating the quality of a specific piece or a collection of student work from various subject areas. They can help to develop a profile of student achievement, typically based on three to seven pieces of work.
- assume that in most cases teachers are observing students as they work. Often, some of the evidence needed to make decisions about a student’s work comes from observations and conversations with students.
- allow for teachers to intervene where students are unable to complete a task independently. The level of assistance required is often one of the criteria for determining whether or not a student’s work falls within grade-level expectations.
- may be adapted as needed. This might mean creating scales for grades not included in the standards, developing IEPs or other tailored evaluation, or adjusting expectations for different times of the year.
The BC performance standards are intended to support instructional decision-making. Teachers may want to consider the following questions as they plan instruction:

- How do these standards match my/our expectations for students at this level?
- What kinds of instructional strategies and learning opportunities will help most students develop the skills they need to meet these expectations?
- What additional support and interventions will be needed to help all students meet these expectations?
- If there are some students for whom these expectations are not appropriate, what expectations should they meet?
- What evidence do I/we need to collect to find out if students are making progress towards the expectations?
Numeracy in BC Schools

Numeracy refers to the application of mathematical understanding in daily activities at school, at home, at work, and in the community. It involves both using mathematical skills and knowing how mathematics can be used to solve problems.

Just as there is more to literacy than teaching the rules and procedures of language, there is more to numeracy than teaching the rules and procedures of mathematics. Numerate individuals not only “know” mathematics, but understand it in personally meaningful terms. They feel competent and confident about their ability to draw on the necessary knowledge and apply it in new and relevant ways.

Numeracy and Mathematics

Numeracy as a skill area is currently evolving in the BC school system. The following is the understanding of the term as it is used in this document. This may be refined and adjusted as our understanding improves.

Numeracy involves concrete applications in which students, confidently and independently, use mathematics to address real tasks or problems in an increasing variety of situations. The ability to recognize the mathematical demands and possibilities in a situation is an important aspect of numeracy.

Numeracy is based on mathematical foundations and requires the application of concepts and skills related to the formal aspects of the discipline of mathematics. These formal aspects are reflected in the organizers for BC mathematics curricula:

- Number (Concepts and Operations)
- Patterns and Relations
- Shape and Space
- Statistics and Probability
- Problem Solving (Grades 8-12)

Numeracy tasks and problems typically draw on concepts and skills from two or more of the curriculum organizers listed above, and can
be grouped according to purpose or context. For example, Human Resources Development Canada describes numeracy as an essential skill and identifies five contexts or applications in which adults are required to apply mathematical concepts and skills in the workplace:

- money math
- scheduling or budgeting and accounting math
- measurement and calculation math
- data analysis math (including chance)
- numerical estimation

Part of a Comprehensive Picture

The BC performance standards for numeracy can be used to evaluate students’ abilities to use the mathematics they have learned to address concrete, practical, and age-appropriate tasks and problems. The performance standards do not address all aspects of the mathematics curricula and need to be used in combination with other forms of assessment to develop a comprehensive picture of student achievement in the BC mathematics curricula.

Although this document currently includes only grades 1 through 8, it is the intention that numeracy be a focus in BC classrooms from Kindergarten to Senior Secondary. Work is ongoing in this area.

Curriculum Connection

In BC schools, primary responsibility for developing and evaluating mathematical skills is assigned to mathematics. Depending on the tasks developed or selected, using the numeracy standards can help teachers address a wide range of outcomes from the provincial mathematics curricula.

However, students are expected to apply and extend their numeracy skills in a variety of content areas (e.g., map reading/making in social studies; constructing/interpreting data tables and graphs in science; data analysis and evaluation in areas such as history, English language arts, and career and personal planning; tracking progress in physical education; using perspective in visual arts). The performance standards for numeracy have therefore also been developed to apply in all curriculum areas.
Aspects of Numeracy

The performance standards focus on four aspects of numeracy, as described here.

CONCEPTS AND APPLICATIONS
- recognizing the mathematical demands and possibilities in a situation or task
- applying grade-specific concepts and skills
- recognizing and using patterns and relationships

Evidence comes from observing and talking to students and analyzing their work. In school, many numeracy tasks simulate real applications (rather than having students find problems to solve on their own) and thus do not provide evidence of ability to recognize the mathematical possibilities in a situation.

STRATEGIES AND APPROACHES
- structuring the task into logical steps or stages
- verifying solutions

Evidence comes from observing and talking to students and analyzing their work. With younger students, most evidence comes from observation. Older students may clearly demonstrate these features in their written work if the task is structured to require it.

ACCURACY
- recording and calculations

Evidence comes from examining student work.

REPRESENTATION AND COMMUNICATION
- presenting work
- constructing charts, tables, diagrams, and displays
- explaining procedures and results

Evidence of presentation and construction comes from examining student work. It is usually necessary to prompt students to specifically explain procedures and results. Evidence of this aspect is most effectively gathered through conferences; however, students can also provide written explanations.